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who first began to gather statistics upon it.* They probably depend also upon differences in the color sense of the classes of individuals tested, which if properly followed up, would lead to much needed knowledge of the causes of color-blindness, and of the laws which govern it. In some recent experiments upon a closely-allied topic—the sensitiveness of the eye to colors of a low degree of saturation †—I discovered among fifty-four of the young men and women, who kindly aided me in that investigation, and who were also included in the color-blind tests, the following almost universal peculiarity of color-perception, which is probably closely related to this prevalence of green-blindness. This peculiarity consists of a marked lack of sensitiveness to the presence of *green* when mixed with large quantities of white. It was found, for instance, that on the average, these observers could detect the presence of 25.2 parts of red lead when mixed with 100,000,000 parts of white, 23.9 parts of chrome yellow, and 125.5 parts of ultra marine, under the same circumstances; whereas 864.3 parts of chrome green in 100,000,000 were necessary to the detection of the pigment.

In describing those experiments, I ventured the suggestion that the difference is due to a blunting of the nerves, the function of which it is to carry the perception of green to the brain, by continual exposure to the hues of foliage, etc. That temporary incomplete color-blindness may be induced at will by wearing spectacles of a tint that overtaxes certain sets of nerves, is well known. May not life-long exposure to the prevailing green of the landscape, generation after generation, well be supposed to produce permanent incomplete green-blindness?

## THE WATER OF THE FORT SCOTT ARTESIAN WELL.

BY E. H. S. BAILEY AND E. W. WALTER.

Several months ago our attention was called to the new artesian well which had been bored at Fort Scott, in this State. Through the kindness of Mr. E. F. Ware, the secretary of the Artesian Well Company, we received samples of the water, with details of the conformation of the strata through which the boring passed. The original idea was to sink a gas well; little gas however has been noticed, but a flowing artesian well has been the result of the enterprise. A water of a slighty sulphurous odor rises smoothly and steadily in the six-inch tube.

In regard to the position of the well, its mouth is 840 feet above the level of the sea, this computation being based on the surveys of the Gulf Railroad Company. The well is bored upon the first bench on the south side of the Marmaton river, at the foot of the bluff, and 550 feet from the channel. The mouth of the well is 100 feet lower than the plateau. Above the mouth of the well is the bluff, consisting of limestone, hydraulic cement rock, coal, fire clay, and bituminous shale.

The diameter of the well is eight inches down to 335 feet, to which point the well was tubed with iron pipe to shut off the surface-water. Below that point the well was bored dry 45 feet to a depth of 380 feet, at which point the drill struck a 14-inch crevice and salt water rose to within 10 feet of the surface.

The boring was continued to a depth of 610 feet, when a different kind of water was reached, which began to flow slowly from the well. At a depth of 621 feet, the boring was discontinued, and the drill removed. Since that time—September 8th, 1884—the well has flowed a clear, steady stream of over 10,000 gallons per day. There seems to be a continuous flow, without any gaseous agitation. The pressure will carry the water five feet above the mouth of the well in a tube, at which height it remains stationary, and ceases to flow until the altitude of the pipe is diminished.

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*Among the most extensive and reliable of all color-blind tests are those recently carried on by our own countryman, Dr. B. Joy Jefferies, who has tested 19,101 men, of whom 801 (4.18 per cent.) were color-blind; and 14,731 women, among whom he found but 11 cases. Other observers give averages varying from 1 per cent. to 8 per cent.

†Paper read before Section B, of the American Association for the Advancement of Science, Philadelphia, September 5, 1884.

The drill record, which is an interesting one, is as follows:

| | | *Total.* |
|---|---|---|
| Wash dirt, | 25 feet | |
| Clay, | 5 " | 30 feet. |
| Soapstone, | 15 " | 45 " |
| Slate, | 3 " | 48 " |
| Coal, | 2 inches | . . . |
| Soapstone, | 15 feet | 63 " |
| Slate, | 2 " | 65 " |
| Coal, | 2 inches | . . . |
| Soapstone, | 17 feet | 82 " |
| Blue limestone, | 3 " | 85 " |
| Soapstone, | 95 " | 180 " |
| Soft sandstone, | 5 " | 185 " |
| Soapstone, | 70 " | 253 " |
| Brown sandstone, | 25 " | 280 " |
| Grey sandstone, | 7 " | 287 " |
| White sandstone, | 25 " | 312 " |
| Slate, | 12 " | 324 " |
| Fire clay, | 4 " | 328 " |
| Soapstone and slate, | 10 " | 338 " |
| Slate and iron pyrites, | 5 " | 343 " |
| Flint, | 23 " | 366 " |
| Flint and limestone, | 14 " | 380 " |
| Crevice, | 14 inches | . . . |
| Limestone, | 4 feet | 385 " |
| Lime and flint, | 75 " | 460 " |
| Very hard flint, | 5 " | 465 " |
| Mixed flint and limestone, | 156 " | 621 " |

For the last 230 feet the borings were white, mixed with gray, the pieces showing frequent specks of iron rust.

Upon analysis, the water is shown to contain the following ingredients, estimated in grams per liter:

| | |
|---|---|
| Boracic acid, | .0378 |
| Chlorine, | .9209 |
| Magnesia, | .1642 |
| Lime, | .1142 |
| Ferric oxide, | .0078 |
| Sodium oxide, | .7348 |
| Sulphuric anhydride, | .0836 |
| Sulphuretted hydrogen, | .0025 |
| Silica, | .0163 |
| Organic matter, | .0200 |
| Potassium oxide, | Trace |
| Lithium, | Trace |
| Carbonic acid gas, | Undetermined |

These constituents are probably combined as follows, the weights being computed in grains per U. S. gallon of 231 cubic inches:

| | |
|---|---|
| Hydrosulphide of sodium, | .188 |
| Chloride of sodium, | 79.471 |
| Biborate of soda, | 2.204 |
| Chloride of potassium, | Trace |
| Chloride of lithium, | Trace |
| Chloride of magnesium, | 7.987 |
| Chloride of calcium, | .787 |
| Sulphate of lime, | .829 |

| | |
|---|---|
| Sulphate of soda, | Trace |
| Bicarbonate of lime, | 14.238 |
| Bicarbonate of iron, | 1.006 |
| Bicarbonate of magnesia, | .305 |
| Silica, | .951 |
| Organic matter, | 1.166 |
| Total solids, | 109.132 |
| Sulphuretted hydrogen, | Trace |
| Carbonic acid gas, | Trace |
| Temperature, | 67½° |

This may be classed as a sulpho-saline water, containing borax as a rare ingredient. On comparison with other waters, we find that it is similar to some springs in Kentucky, only not as strong. These do not contain borax. The Fort Scott water is probably a mixture of streams from different depths.

## NOTES ON THE FOSSIL JAW OF BISON, FROM THE PLIOCENE OF NORTON COUNTY.

BY ROBERT HAY.

Over a year ago we picked up a jaw, semi-fossilized, in the talus from bluffs in which the line of separation, or rather contact, of the Loup Fork Miocene and the Equus beds of Pliocene above, was not difficult to trace. It was therefore not possible to determine which of the two formations yielded the bone, or whether it might not have been in the soil at the top. The remarkable wearing of two of the teeth led us to preserve the specimen, and Dr. Turner, who was with us at the time, very soon afterwards found another jaw with the same wear on the teeth, and that he dug out out of the Pliocene. Drawings and descriptions of both fossils have been submitted to Professor Cope separately, and he pronounces each to be bison. The remarkable wearing of the teeth we have thought pointed to some habit of browsing and pulling of the branches of trees, but Professor Cope suggests that it was caused by eating herbage, mixed with sand and gravel, before the other teeth were cut. It is probably all that is left of the most ancient Kansas buffalo. The following are the dimensions of the first-found specimen, in millimetres:

RIGHT MANDIBULAR RAMUS OF BISON.

| | *Mm.* | | *Mm.* |
|---|---|---|---|
| Total length, | 400 | Length of tooth No. 3, at surface, | 16 |
| Total height, | 230 | Length of tooth No. 4, at surface, | 23 |
| Height at posterior extremity, | 210 | Length of tooth No. 5, at surface, | 26 |
| Breadth, exclusive of teeth, | 67 | Length of tooth No. 6, at surface, | 38 |
| Breadth, inside, | 74 | Height of No. 6, | 23 |
| Length of line of teeth at base, | 45 | Width of No. 6, | 16 |
| Length of tooth No. 1, at surface, | 11 | Thickness of ramus, | 36 |
| Length of tooth No. 2, at surface, | 15 | | |

## A NEW METHOD OF STUDYING ABSORPTION SPECTRA.

BY W. S. FRANKLIN.

This method is the one used by Prof. Edw. L. Nichols in studying the light emitted by glowing platinum,* and in his measurements of the reflection spectra of pigments.† Figure 1 in the accompanying plate represents the slit of the spectrophotometer, with attachments, as modified for the quantitative study of absorption spectra.

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*American Journal of Science and Arts, Vol. XVIII, Dec. 1879.

†American Journal of Science and Arts, Vol. XXVIII, Nov. 1884.